DESCRIPTION

In this design the main feature is to investigate weather an airplane with medium wing loading (25#/□) and no flaps, would have a comparative performance with the best of other types having a relatively high wing loading (40#/□) and flaps necessary for low landing speed.

For comparison, I chose two recent airplanes, namely Lockheeds new 4 motored transport and Consolidated's new 4 motored army bomber. Since these ships have about a 40#/□ wing loading they necessarily have to have flaps to get a minimum speed of 80 m.p.h.

In order to accomplish what I started out to do it seemed necessary to design a flying wing. Since with this type a lower wing loading is possible without the use of excessive wing area, because practically all of the structure contributes to lift, it was considered tentively. On the other hand the general opinion is a little skeptical about flying wings as yet. Therefore I thought of a compromise in using a main wing of relatively high $C_{L\,max}$ and low $C_{D\,min}$ with a small C_{mo}. This wing is then increased in depth at the center sufficient to house the bombs, extended forward to make room for the personnel and extended rearward only sufficiently to mount a small elevator; The ruddevs being mounted on the wing trailing edge and rather near the tips. Furthermore, it seemed advisable to place the motors in the wing and mount the propellers in the rear since this installation will probably be the most efficient. A tricycle landing gear is used for best all around design.

The next consideration is chose of wing section. I selected the N.A.C.A. 24 since it has a relatively high $C_{L\,max}$ (1.67) and a high $C_{L\,max}/C_{D\,0\,min}$ (246) and a zero C_{mo}.

After considerable calculation I decided on using the above section with 10% thickness, aspect ratio of 10 and a .3 taper ratio. The results indicate a $C_{L\,max}$ (1.54) at 80 m.p.h., a $C_{D\,min}$ (.0058) at 315 m.p.h. and $C_{m\,0}$ is considered zero.

DESCRIPTION

Since the wing C_{mo} is practically zero the elevator area calculated for static stability is relatively small (160 □'). The rudders being mounted on the wing instead of on the tail thus allowing more freedom for manuvering of the rear guns, so essential in a bomber. Although this rudder arraingement is not so effective at small angles of motion, it is ample at 20° travel.

The resulting preliminary design is estimated to weigh about 40000# with a bomb load of 8800# and 1000# of ammunition for 4-.50 caliber machine guns. Its personnel consists of 6 men, 1 commander & radio operater combined, 2 pilots, 1 bomber and 2 gunners.

For comparative performance see table below

	LOCKHEED	CONSOLIDATED	SCHULT S-12
Weight #	40000	40000	39964
H.P.	4000	4000	4000
W/S #	40	Data	25
V_{min} S.L. m.p.h	79	Not	80
V_{max} S.L. m.p.h.	300	Available	315
R/C S.L. 1/min	1515	Yet	1900
Service Ceiling'	25200		31500